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(71) Applicants and

(72) Inventors: **FREDERICKSON, Christopher** [US/US];
101 christopher Columbus Blvd., Galveston, TX 77550
(US). **HENRICHES, Paul, Mark** [US/US]; 2209 Macondo
Lane, Houston, TX 77027 (US).

(74) Agent: **ADLER, Benjamin, A.**; Adler & Associates, 8011
Candle Lane, Houston, TX 77071 (US).

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(54) Title: MAGNETIC RESONANCE IMAGING OF METAL CONCENTRATIONS

(57) **Abstract:** Provided herein is a method of magnetic resonance imaging (MRI) for *in vivo* mapping of concentration of a target metal ion in at least one tissue using a contrast agent selectively sensitive for the amount of target metal ion where the contrast agent itself contains a non-hydrogen imaging nucleus. Also provided a method of diagnosing a disease state and of monitoring the efficacy of a therapeutic regimen to treat the disease state using the magnetic resonance imaging methods.